A.98 ALERO Corp M-2 12/9/81

213-222 577.381

HVAC SPECIFICATION

NO. ___ OF ___ SHEETS

REQUIREMENTS

All mechanical work shall be free from defects in workmanship and materials for a period of one (1) year from date of final acceptance and shall meet all local and state codes. All defects, which develop or are discovered within this period shall be repaired by the Contractor to the satisfaction of the Engineer and at no additional cost to the Authority.

GENERAL

1. The Contractor shall examine the site of the proposed work to determine the existing conditions that may affect his work.
2. It is the intention of the Contract Drawings and Specifications to call for finished work, tested and ready for operation. All materials shall be new and of first-quality.
3. All material, work, incidental accessories or other details not shown but necessary to make the work complete and perfect, and in all respects ready for operation, even if not particularly specified, shall be provided by the Contractor at no additional cost to the Authority.
4. The Contract Drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangement of ductwork and pouches, and induction units. Existing ducts, pipes, utilities, etc. that are damaged during construction period, whether or not due to the Contractor's negligence they shall be repaired or replaced by the Contractor and left in a condition satisfactory to the Engineer.
6. Coordinate locations of all pouches with architectural reflected ceiling plans.
7. The space around pipes, ducts, etc. penetrating rated walls, shall not exceed 1/2" and shall be packed solid with THERMAFIBER or equivalent. Perimeter shall be closed off by tight fitting metal escutcheons on both sides of this construction as required by Sections C26-504.5 of N.Y.C. Building Code.

MATERIALS FURNISHED BY THE AUTHORITY

1. The Authority shall ~~furnish~~ to the Contractor the materials ~~in the~~ quantities as shown below for installation ~~in the~~ permanent construction. The furnishing and installation of any materials in excess of the quantities shown below shall be the responsibility of the Contractor. (NIC (TYPICAL))

   a. Light fixture air pouches
   b. ~~Round flexible~~ duct for air connection to pouch (AS REQUIRED)
   c. Induction Units

MATERIALS TO BE RETURNED TO THE AUTHORITY

1. The Contractor shall deliver all excess materials as shown below to a designated area in the W.T.C. complex as directed by the Engineer.

   a. Light fixture air pouches
   b. Round flexible duct for air connection to pouch
   ~~c. Induction Units~~

MATERIALS PURCHASED FROM THE AUTHORITY

1. The Contractor shall purchase the following materials from the Authority as required for the installation.

   a. Light fixture air pouches
   b. Round flexible duct for air connection to pouch
   ~~c. Induction Units~~

DUCTWORK

1. All ductwork shall be furnished, (AND HIGH) installed and fabricated in accordance with the latest edition of the SMACNA Low Velocity Duct Construction Standards Manual, using prime sheets of galvanized steel. All square elbows shall be provided with turning vanes on maximum 4" centers. Provide access doors at all fire and automatic dampers for access.
2. All branches and take-offs shall be equipped with volume controllers.
3. All Finger ducts and flexible connectors shall be 7"Ø unless otherwise indicated on drawing.
4. Support horizontal ducts with hangers secured to structural steel above at intervals not exceeding 8'0". Install additional steel as required.
5. Flexible connections to the supply duct and the diffuser plenum of ceiling pouches shall be sealed with 3M Co. 800 sealant and clamped with Stainless Steel Ideal Type 52 clamps.
6. All access doors shall be as per latest SMACNA Standards.
7. Remove existing 4" round flexible duct connection that penetrates the 2 hr. rated closure panel within the induction unit cover. Install new 4", 26 gauge galvanized steel circular duct, seal all joints with 3M Co. 800 sealant and stainless steel adjustable type clamps. A maximum length of 4'-0" of flexible ductwork shall be used for connection to the induction Units.

INDUCTION UNIT (Furnished by the P.A.)

1. Install where shown on the drawing, a factory assembled high pressure air-water induction type, summer winter room air conditioning unit, properly connected to primary air conduit and water piping. Induction unit shall be as manufactured by Carrier for the World Trade Center Model #36SL60H- - Type . The unit shall deliver cfm with a cooling capacity of BTU and heating capacity of BTU.
2. Support and fasten unit to prevent all vibration, providing all required wall brackets supporting legs and leveling devices. Unit support method shall be subject to the approval of the Engineer and be similar to the method used for the existing unit.
3. The Contractor shall adjust induction unit performance as shown on the drawing.
4. The air connection to the induction unit shall be made with "Thermoflex" Type S-TL as manufactured by Automated Industries or approved equal, of sizes shown, but not less than the full unit inlet size. The connections shall be sealed with Minnesota Mining & Mfg. Co. 800 sealant and clamped with Ideal Type 52 hose clamps, or approved equal. Flexible connections that penetrate any rated closures shall be installed as specified.

PIPING

All piping connecting to the induction unit shall be Copper ASTM B-88, soft (annealed) Type L and fittings shall be standard weight, wrought copper and solder type. All soldered joints shall be made with 95-5 Tin Antimony Solder having a melting point greater than 450°F. All soldered joints shall be thoroughly cleaned before the application of the solder. All insulation shall match existing.

LINT SCREEN AND AIR TRANSFER FITTING

The Contractor shall provide lint screens and air transfer fittings for specified induction units.

FIRE DAMPERS

Fire dampers are based on Air Balance, Model #410 Type AL. They shall be installed in accordance with the manufacturer's approved installation instructions and shall be N.Y.C. Board of Standards and Appeals (B.S.A.), Underwriters Laboratories (U.L.) approved and labeled.

VIBRATION ELIMINATORS

Vibration hangers shall be HDA-GREEN(4 Req'd.) as manufactured by Mason Industries or an approved equal.

CEILING EXHAUST FAN

The Contractor shall furnish and install exhaust fans of the size and capacity as shown on the Fan Schedule. Fans shall be similar or equal to those as manufactured by Greenheck Fan Ventilator Corporation.

FAN SUPPORTING REQUIREMENTS

1. All supporting steel shall conform to ASTM Designation A-36
2. Patch existing beam fire proofing where removed
3. All nuts to have lock washers
4. Contractor to verify and field measure existing conditions
5. Paint all steel

MOTOR OPERATED DAMPER

1. Electric modulating opposed blade damper motor shall be Honeywell M944A1010 for 24V A.C. Operation with Transformer as required for 120V Service or an approved equal.
2. Thermostat shall modulate damper from fully open to 20% open - shall be Honeywell T921A1191 to match motor operated damper M944A1010 or an approved equal.

CEILING REGISTERS, GRILLES, DIFFUSERS & LINEAR

Model numbers specified are manufactured by Anemostat--Waterloo or an approved equal. All finishes shall be baked white enamel.

~~1. Registers (Supply):~~	~~shall be Model S2VO~~
~~2. Registers (Return):~~	~~shall be Model S3HOD~~
3. *Grilles (Return):*	~~shall be Model S3HD~~ TO MATCH EXIST. GRILLE
4. Diffusers (Supply):	shall be Model DF with No. 41 core pattern (4-way)
	shall be Model DF with No. 25 core pattern (2-way)
	~~shall be Model DF with No. 11 core pattern (1 way)~~
~~5. Linear Supply Diffusers:~~	~~shall be Model SLAD-F-50, 2-1/2" slot widths (Horizontal Pattern)~~
~~6. Linear Return Diffusers:~~	~~shall be Model SLAD-F-50, 2-1/2" Slot widths~~
7. Damper:	Damper for diffusers shall be Model DO8.

WATER COOLED AIR CONDITIONING UNIT

1) Furnish and install a packaged air conditioning unit. Unit shall be complete with temperature control, filters, compressor, evaporator coil, condenser water regulating valve and other system components required to provide proper air conditioning for the space designated on the Contract Drawings. Filter shall be Class I, UL listed; 45% efficiency.

2) AC Units shall be furnished with the following accessories:

   a) Condensate Pump
   b) Humidifier and Reheat
   c) Disconnect Switch
   d) WALL MOUNTED CONTROL BOX
   (e) DISCHARGE PLENUM FOR FREE FLOW APPLICATION & FRONT RETURN WITH DECORATIVE GRILLE.

3) Schedule

Unit No.	CFM	Blower Motor H.P.	External S.P.	Total Cooling Cap. (Btu) DB.	WB	Auxiliary Cooling Water GPM 85° F E.W.T.	Model No.	Total Wt. (NET)

AC Unit MOTOR SHALL BE phase and for volts.

4) The unit shall be factory run, tested and rated in accordance with ARI Standards.

5) AC Unit shall be complete with water regulator valve. Valve shall be rated for psi working pressure.

6) Unit(s) shall be similar or equal to Liebert Corporation and rated at lbs. working pressure.

(7) VIBRATION PAD SHALL BE SHEAR FLEX-FLEX PLATE AS MANUFACTURED BY VIBRATION MOUNTING & CONTROL INC. OR AN APPROVED EQUAL.

PIPING AND ACCESSORIES

PIPING

A. Test Requirements (Aux. Cooling Water)

Operating Pressure	PSIG
Operating Temperature	80 F - 100 F
Hydrostatic Test Pressure	1.5 x Operating Pressure
Duration of Test	2 hours

Isolate equipment, controls, instruments and valves from the piping system during hydrostatic tests.

B. Piping & Fittings

System	Pipe	Fitting
Aux. Cooling Water	Black Steel Pipe, Conforming to ASTM A-53 Schedule #40 Grade B, BLACK SEAMLESS	2-1/2" cast iron screwed 250 lb. class
A.C. Unit Condensate Drain	Copper ASTM B-88 Hard Temper Type (L)	Wrought Copper Solder Joint 5 ANSI B16.18
Domestic Water	Hard Temper Copper Type (TP)-ASTM B302	Cast Bronze for Brazing - ANSI B16.18

Vent auxiliary cooling water piping at all high points.

C. Accessories

1. Unions for auxiliary cooling water service shall be similar and equal to 250 lb. class, malleable iron with bronze seats, Grinnell Figure 554, U.L.
2. Nipples 6" length or less, shall be extra heavy and THE MATERIAL SHALL BE THE SAME AS THE PIPE. Close nipples shall not be used.
3. Braided type flexible connector shall be Vibration Mounting and Control Inc., (VICO) Model MFP Style NE Max. 280 psig or approved equal.

D. Soldered Joints

95-5 Tin Antimony Solder having a melting point greater than 450 F. Excess solder shall be removed while still in a moltin state with a fillet left at the face of the fitting.

E. Thermometers

1. Thermometers for piping shall be of the "all angle" (universal), separate socket, industrial type with #304 stainless steel extension neck wells.
2. The thermometer for auxiliary cooling shall operate at 0 - °F range and shall include a sufficient safety margin at either end.
3. Thermometers shall be as manufactured by Albert A. Weiss, Weksler Instrument Co., Ashcroft or approved equal.

F. Pressure Gauges

1. Pressure gauges shall be of the bourdon tube spring type with 4-1/2 dial sizes. Gauges shall have black aluminum cases with black numbers on white background. The gauges shall be as manufactured by Albert A. Weiss, Weksler Instrument Co., Ashcroft or approved equal.
2. The pressure range for the auxiliary cooling, shall be 0°F - °F psi and the Bourdon tube shall be bronze.

G. Strainers

Strainers shall be similar and equal to those manufactured by Mueller Steam Specialty Co. Screwed "Y" strainers for pipes 2 1/2" and smaller shall be 250 lb. No. 11. The screens for the strainers shall be stainless steel. Strainers shall be provided with capped blowdown valves.

H. Sleeves and Escutcheons

Exposed piping passing through walls shall be fitted with chromium plated cast brass escutcheons with fastening set screws similar and equal to Fee & Mason Manufacturing Co., F & S Manufacturing Co. or Ritter Pattern and Casting Co.

I. Pipe Supports and Hangers

1. All supports and parts shall conform to the latest requirements of the ANSI Code for pressure piping B31.1.0 and MSS standard practice SP-58.
2. Hangers shall be manufactured by Grinnell Co., Central Iron, Fee and Mason, Blawknox Co. or an approved equal.
3. Pipe hangers, rods, inserts and clamps shall be those approved for their respective uses by the Underwriters' Laboratories, Inc.
4. Unless otherwise specifically approved, hanger size and spacing shall be:

Pipe Sizes	Max Hanger Spacing	Minimum Rod Sizes
1/2" to 1"	9 ft. o.c.	3/8"
1-1/2" to 2-1/2"	9 ft. o.c.	1/2"
2-1/2" to 4"	10 ft o.c	1/2"

J. Valves

Type	Size	Pressure	Jenkins Fig. No.	Crane Fig. No.	Stockham Fig. No.
Gate	Up to 2"	125 psi	47U	428-UB	B-105
Gate	Up to 2"	150 psi	49U	431	B-128
GATE	UP TO 2"	200 PSI	280U	654E	B-144

2. Balancing valves shall be non-lubricating CENTRIC PLUG (BALL CENTRIC) TYPE WITH ADJUSTABLE STOP. VALVE SHALL BE RATED FOR 175 lb WOG OR 400 lb WSP. VALVES SHALL BE AS MANUFACTURED BY HOMESTEAD INDUSTRIES OR APPROVED EQUAL.
3. Domestic Water

   (a) Gate Valves; Fairbanks Fig. 0250-FB
   (b) Check Valve - Fairbanks Fig. 0640-FB
   (c) Pressure Reducing Valve - Cash Acme Type "EHR"
   (D) VACUUM BREAKER WATTS REGULATOR CO. MOD. NO. 288A-C.

K. Pipe and Valve Identification

1. Provide and affix a set of approved adhesive bands identifying the system and direction of flow.
2. Each set shall consist of one band on which the name of the service is printed in letters not less than 1 inch high.
3. Bands shall be in colors as indicated below and shall conform to ANSI Standard A-13.1.

System	Background	Letters and Arrow
Auxiliary Cooled Water	Green	Black

Adhesive bands shall be W.H. Brady Company, Seton Corp. or an approved equal.

L. Threaded Joints

Steel pipe threaded joints shall be made tight using only an approved pipe joint compound or tape, placed on the male thread only.

INSULATION FOR AUXILIARY AIR

All insulations (including jacket or facing and adhesive) shall have composite fire and smoke hazard ratings as tested by procedure ASTM E-84, NFPA 255 and UL 723 not exceeding a "Flame Spread" of 25 and "Smoke Developed" of 50.

1. Material

   a) 1-1-1/2" thick flexible fiberglass insulation with a minimum density of 3/4 pound per cubic foot.
   b) The insulation shall have thermal resistance of R-6 at 75 F mean temperature.
   c) Insulation shall be similar or equal to Johns-Manville R-Series fiberglass flexible duct insulation with Type FSK facing.

2. Installation

   a) Insulation shall be wrapped tightly on duct work with all circumferential joints butted and longitudinal joints overlapped a minimum of 2".
   b) Insulation shall be secured in place with 18 gauge copper clad wire loops 12" on centers. All joints lapped and sealed in place with Benjamin-Foster 85-20 adhesive, Epolux 400 or approved equal. Adhesive shall be applied so that insulation conforms to duct surfaces uniformly and firmly.
   c) All joints shall be sealed with 2" wire vapor-barrier strips using a fire resistive adhesive. All cuts and tears shall be sealed with strips of barrier jacket applied with adhesive.

INSULATION FOR DOMESTIC WATER AND CONDENSATE WATER

Insulation: 1/2" thick one piece fiberglass, flame spread rating not greater than 25", smoke rating "50". (Insulate valves and fittings.)

CUTTING AND PATCHING

1. Piping passing through walls shall have a trim opening cut no greater than necessary for the installation of a sleeve secured therein. Sleeve shall be 1/2" in diameter larger than the outside diameter of the pipe or required insulation passing through and of sufficient length to be flush with the finished wall surfaces.
2. Piping passing through concrete floors shall have the opening core drilled 1/2" in diameter larger than the outside diameter of the pipe passing through.
3. Annular spaces between piping and sleeves or core drilled floor openings shall be packed with thermafiber and sealed to retain the fire integrity of the walls and floors with a non-hardening compound similar and equal to Uniseal or Duxseal as manufactured by Johns-Manville Co.

EXECUTION

1. All work in occupied tenant areas shall be performed on other than normal working hours as directed by the Engineer.
2. The Contractor shall notify the Engineer when shut-down of existing systems becomes necessary. Shut-down time shall be kept to a minimum.

BALANCING

The Contractor shall provide the services of an air balancing and hydronic testing specialist who specializes in Heating, Ventilating and Air Conditioning systems. Perform all balancing in accordance with sheet metal and air conditioning Contractors National Association (SMACNA).

SUBMITTALS

Submit for approval three (3) sets of shop drawings of ductwork, ~~piping and details of fire damper installations~~. Submit three (3) sets of catalog cuts for ~~fire dampers, A.C. UNIT~~, exhaust fan, ceiling grilles, ceiling diffusers, ~~linear diffusers, ceiling or side blow registers, valves, accessories~~ and three copies of air balancing data report.

PRIMARY AIR INSULATION
REMOVE REQUIRED INSULATION FOR THE INSTALLATION OF THE FIRE DAMPER ASSEMBLY AND REINSULATE AS REQUIRED TO MATCH EXISTING

PIPE WELDS
ALL WELDING SHALL BE DONE IN ACCORDANCE WITH APPLICABLE PROVISIONS OF THE A.N.S.I. CODE B31.1.

GENERAL NOTES

1. For location of ceiling diffusers, ~~registers~~ and grills, see architectural reflected ceiling plans.
2. All ducts penetrating fire rated separation shall have fire dampers and access doors.
3. Unless otherwise noted all fire dampers shall be Type "A".
4. All motorized dampers shall have access doors.

APPROVED G. Galligher 9 JAN 80

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REVISIONS

NO.	DATE	APPD.	DESCRIPTION	NO.	DATE	APPD.	DESCRIPTION

ASST. CHIEF ENGINEER DESIGN — ENGINEER OF DESIGN AIRPORTS & WTC

CHIEF MECHANICAL ENGINEER — CHIEF STRUCTURAL ENGINEER — DATE 12-23-80

THE PORT AUTHORITY OF NY & NJ
THE WORLD TRADE CENTER
TOWER 'A' 98TH FLOOR
ALERO CORP.

MECHANICAL SPECIFICATIONS

CONTRACT NO. WTC-577.381 DRAWING NO. M-2